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Rural Water Supplies in South Dakota : Todd County

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Rural Water Supplies in South Dakota

TODD County

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RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

TODD COUNTY

BY

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AND

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PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections, each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent, in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells Greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft it tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

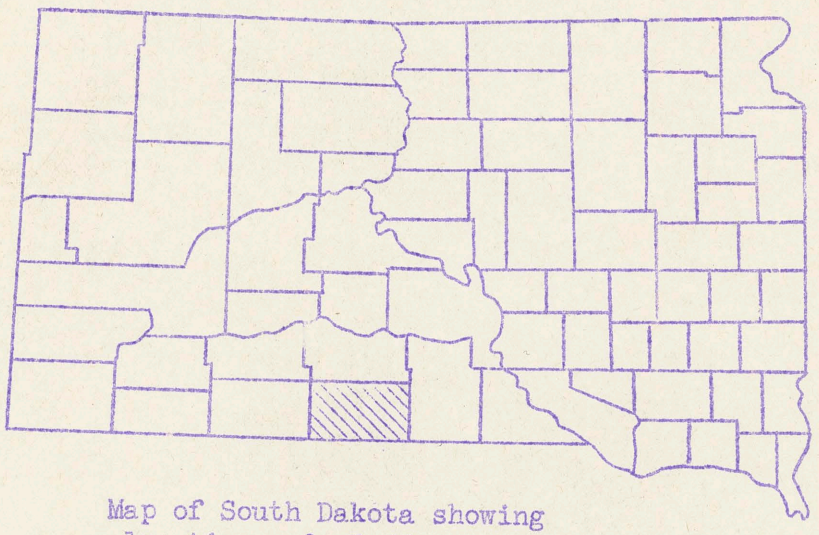
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the receipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Todd County

Todd county lies in the south central part of South Dakota. It is bounded on the north by Mellette county, on the east by Tripp county, on the south by the state of Nebraska, and on the west by Bennett county.



Map of South Dakota showing
location of Todd county

Todd county is an agricultural county with approximately 81 per cent (724,993 acres)of the total 894,080 acres in farms divided into 892 farm units which average approximately 812 acres each. Approximately 40 per cent of the acreage in farms is under cultivation and plowable pasture. Hay, corn, wheat, rye, oats, barley, and sorghum forage are the important field crops,being produced in the order named. Livestock is also important;cattle, horses and mules, sheep, and hogs are valued highest.*

In order that farms of this type may be operated successfully, it is necessary that suitable and adequate supplies of underground water be available and that it be obtained at relatively low cost.Supplies required are not great but they should be generally distributed and constant.The well location map of Todd county indicates that, in general, such supplies are available in many places and are of fairly wide distribution. Water supplies in Todd county,however, have been and will continue to be a most important agricultural problem.

*South Dakota Agricultural Statistics, Annual Report, 1937

On the well location map of Todd county, all wells are shown in red and are called shallow wells regardless of depth. On all other maps, however, and in the tables and text of this report, the term shallow wells applies to those wells of 200 feet depth or less, and those deeper than 200 feet are treated as deep wells.

Questionnaires were sent to 671 farmers and land owners of Todd county, of whom 317 responded with information on 385 wells, 5 cisterns, and one spring. This represented a 47.2 per cent coverage throughout the county. Thirty two farmers reported no wells on the premises.

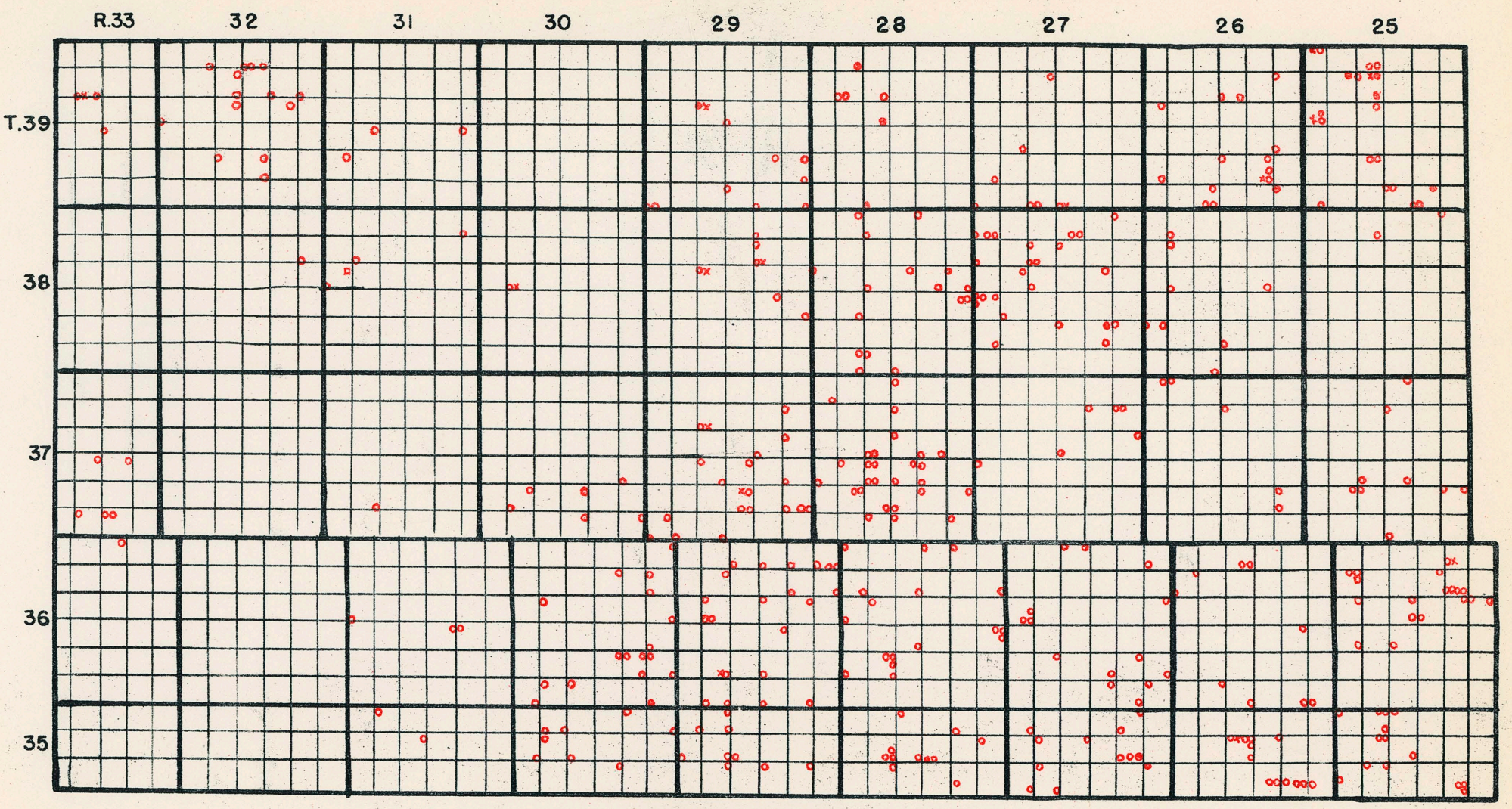
DEPTH AND DISTRIBUTION

Rural water supplies of Todd county are obtained from shallow pumped and flowing wells, and deep pumped wells. Supplies, as reported, were rather well distributed throughout the county.

Shallow wells: Approximately 95 per cent (95.8) of the wells reported in Todd county were shallow wells (pumped and flowing). Of the 369 shallow wells reported, only one was a shallow flowing well. Approximately one fourth (25.2 per cent) of the shallow wells were from 0 to 50 feet in depth, 36.9 per cent from 50 to 100 feet, 26 per cent from 100 to 150 feet, and 11.9 per cent from 150 to 200 feet. Thus, approximately 62.1 per cent of all shallow wells were less than 100 feet in depth. Furthermore, wells within this depth range are also approximately 60 per cent of the total wells reported in the county. The percentage of shallow wells within each 50 foot depth interval is rather evenly divided with depths from 50 to 100 feet reporting 136 (36.9 per cent) of shallow wells reported. The shallow well map on page 8 indicates the various depths at which shallow wells were reported in the county.

A single shallow flowing well was reported in T.35N., R.25W., at a depth of 80 feet. Shallow wells less than 50 feet in depth were few in number in the northeastern part of the county. All shallow wells reported from the follow-

LOCATION OF ARTESIAN AND SHALLOW WELLS IN TODD COUNTY



ing townships in the southeastern part of the county were more than 100 feet in depth:

Twp.	Rge.	Twp.	Rge.	Twp.	Rge.
36N.	31W.	37N.	31W.	38N.	32W.
37	30	38	31		

The following townships in the county reported all wells to be shallow:

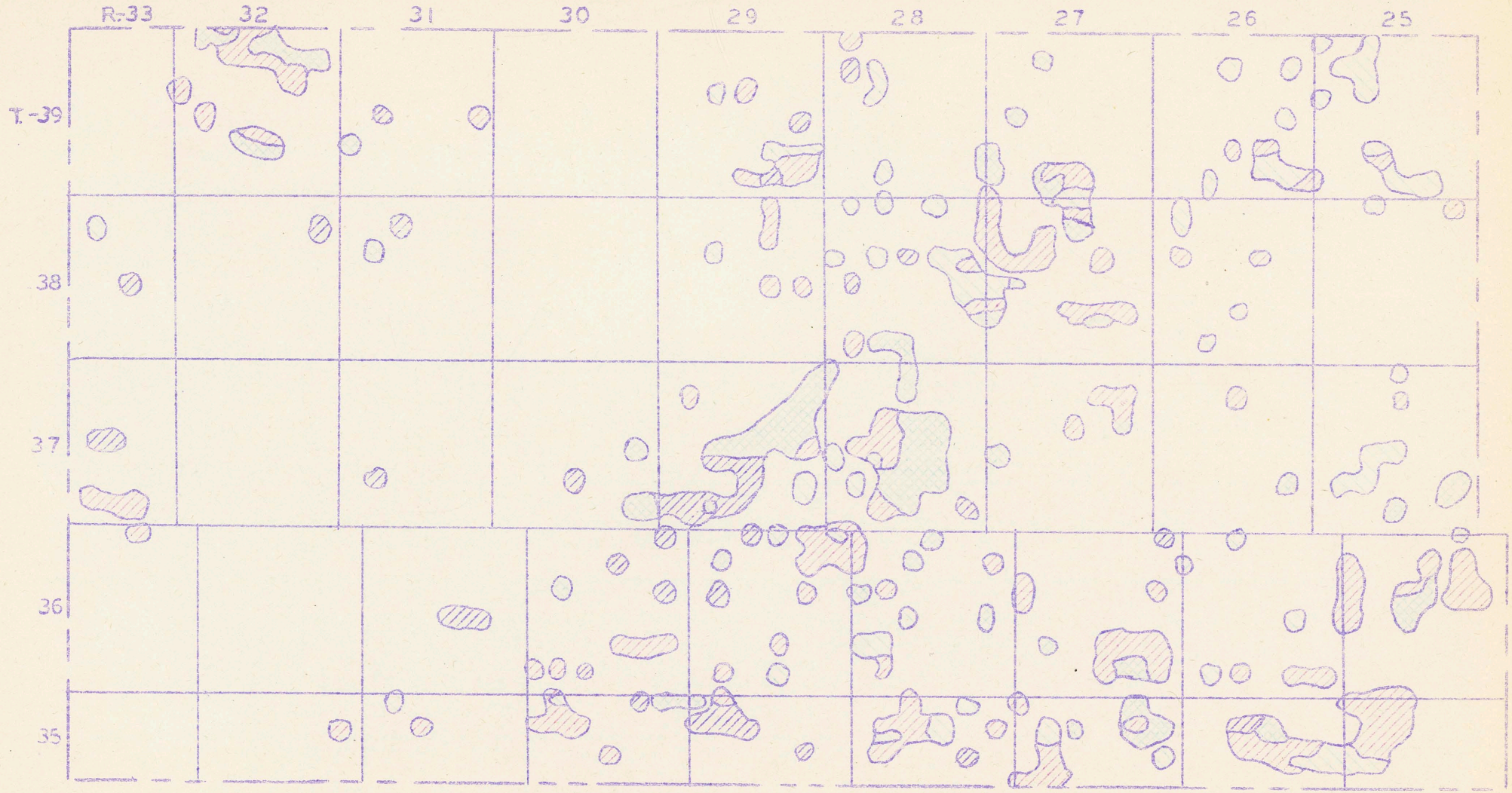
Twp.	Rge.	Number of Wells	Twp.	Rge.	Number of Wells
35N	26W	12	37N	29W	18
35	27	12	37	31	1
35	28	11	37	33	5
35	30	8	38	25	2
35	31	2	38	26	8
35	32	2	38	27	24
36	25	18	38	28	16
36	26	9	38	29	6
36	27	14	38	32	1
36	28	17	39	25	18
36	33	1	39	26	14
37	25	9	39	27	7
37	26	5	39	28	6
37	27	6	39	31	3
37	28	27	39	33	3

Only one township, T.38N., R.30W., reported no shallow wells.

Deep wells: Approximately 4.2 per cent of the rural water supplies of Todd county were obtained from deep pumped wells. No deep flowing wells were reported. Deep wells were reported from ten of the forty townships, a total of 16 in the county. These wells range in depth between 202 and 400 feet (see table 2). In T.39N., R.29W., one well was 250 feet and another 400 feet in depth. The following tabulation shows the location, number, and percentage of total wells of those reported as deep wells. Deep wells predominate in one township only, T.38N., R.30W., and in this township no shallow wells were reported.

Per cent Deep	Location Twp.	Rge.	Number of Wells	Per cent Deep	Location Twp.	Rge.	Number of Wells
7.2	35N	25W	1	50.	37N	30W	3
11.1	35	29	1	100.	38	30	1
9.5	36	29	2	33.3	38	31	1
17.7	36	30	3	18.2	39	29	2
33.3	36	31	1	6.7	39	32	1

TODD COUNTY



SHALLOW WELLS (0-200 FT.)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

N

0-50 FT.

50-100 FT.

100-150 FT.

150-200 FT.

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W. P. 3636

MILES
0 2 4 6

CHARACTER OF WELL WATERS

In order to determine character of water in the county, users were asked to indicate whether they considered supplies hard, moderately hard, or soft. Although chemical analyses are not commonly available to farmers, usage of the water is a fairly satisfactory criterion of quality. Details must await adequate chemical analyses.

Well water supplies, both shallow and deep, produced soft water in Todd county. Among the shallow wells, 3.6 per cent produced hard water, 40.8 per cent moderately hard, and 55.6 per cent soft. Thus, less than 50 per cent (44.4 per cent) of the water from shallow wells was hard or moderately hard. Soft water shallow wells were distributed throughout the county. The following tabulation indicates those townships in which soft water wells predominated:

Twp.	Rge.	Twp.	Rge.	Twp.	Rge.
35N	28W	37N	25W	38N	32W
35	29	37	26	39	26
35	31	37	28	39	27
36	25	37	29	39	28
36	26	37	30	39	32
36	28	37	33		
36	29	38	26		
36	30	38	27		
36	33	38	31		

Soft water wells were reported in almost equal percentages within all depth ranges among shallow wells.

Approximately 53.3 per cent of the water from deep wells was reported soft, 46.7 per cent moderately hard, and none reported definitely hard. Townships 39N., R.25W., and T.35N., R.30W., were the only townships from which notable percentages of hard water from both shallow and deep wells was reported. Most well water in Todd county was reported to be suitable for drinking. Of the waters from 369 shallow wells, only 11 were reported to be unsuitable for drinking. Among the 16 deep wells, only 2 were reported to supply unsatisfactory water. From township 39N., R.25W., four of the wells produced unsuitable supplies and six other townships distributed throughout the

county reported one or two unsuitable wells. Unsuitable well waters are due in some cases to surface contamination, but in others are due to unpalatable or objectionable chemical ingredients in the water. Chemical analyses of the waters map possibly also reveal injurious ingredients in some cases.

ADEQUACY OF WELL WATERS

Most of the wells reported from Todd county produce supplies adequate for present needs, since only 3.9 per cent of the total wells reported were considered inadequate. Needs vary, however, and changes in land use, modification of farm management, or dry cycles in this and surrounding land areas affect the need and the amount of water available in many places.

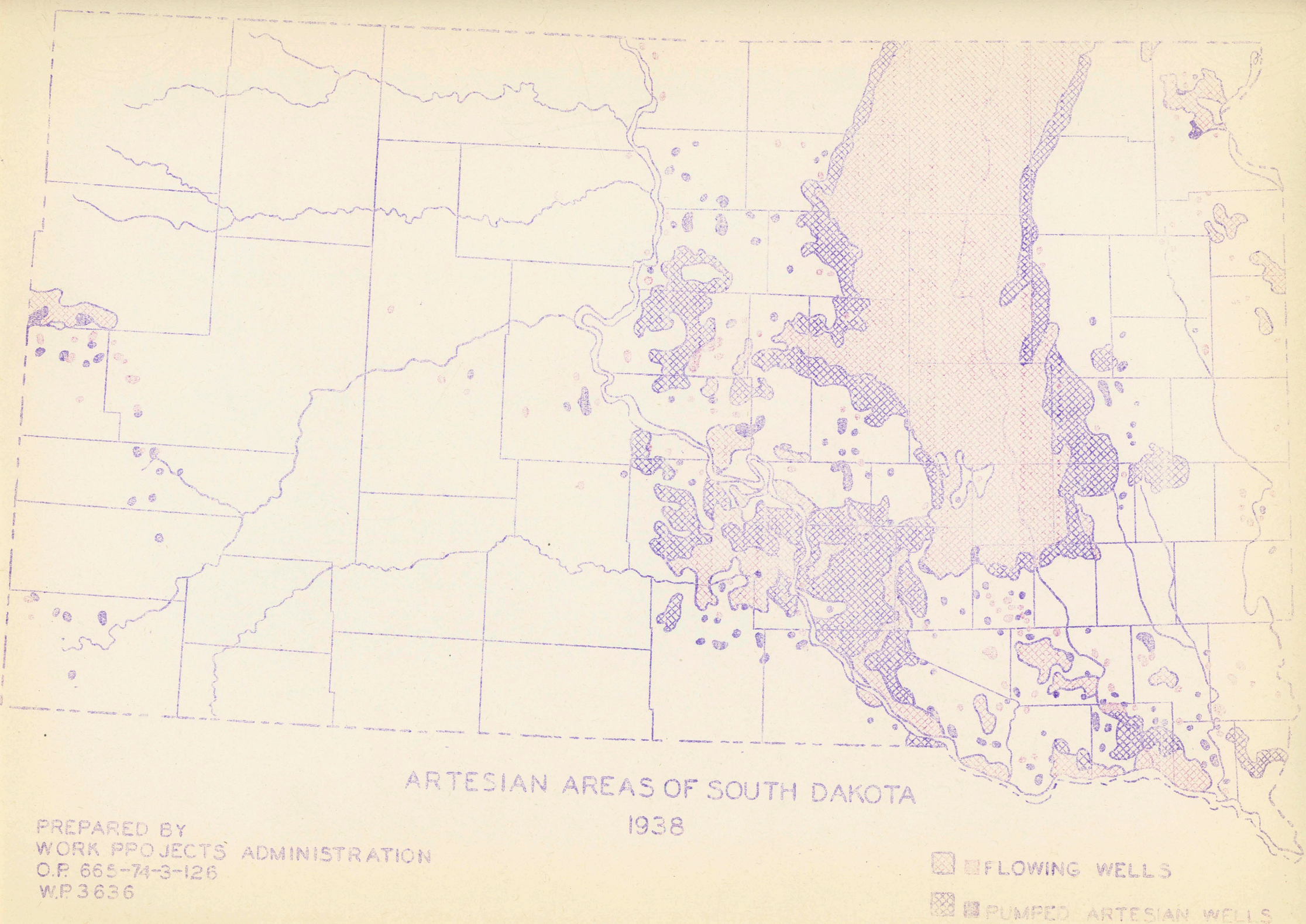
Of 385 wells reported on in the county, inadequate supplies were reported from but 15. Fourteen shallow wells and one deep wells was said to produce an insufficient supply. Approximately 30 per cent of the total shallow wells which were reported inadequate occur in T.39N., R.25W. Inadequacy in these areas was reported by the users to be due to fine sand which cave and clog the wells. The largest percentage of inadequacy was reported among shallow wells from 0 to 50 feet in depth.

The inadequate deep well was reported in T.39N., R.29W., at a depth of 360 feet.

The rate of flow of the shallow flowing well in T.35N., R.25W., was reported to be steady, but the amount of flow per minute was not given.

IRRIGATION

A total of 116 wells in Todd county was reported to be used to irrigate a total of 111 1/2 acres. Of these wells, 111 shallow wells were used to irrigate 31 3/8 acres in garden plots from 1/8 to 8 acres in size and five deep wells were used for irrigating 80 1/8 acres, of which 80 acres of field was irrigated in T.35N., R.25W., by one well 206 feet deep.


ARTESIAN AREAS OF SOUTH DAKOTA
1938
PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P. 665-74-3-126
W.P. 3636
FLOWING WELLS
PUMPED ARTESIAN WELLS

SUPPLEMENTARY SUPPLIES

Springs are not an important source of supplementary water supply in Todd county, since only one was reported and this one in T.38N., R.31W. This spring produced soft water which was reported to be unsuitable for drinking.

Cisterns are not as important a source of supplementary supplies in Todd county as in many nearby counties of the state where regular supplies are too hard for laundry purposes, or where well supplies are inadequate or unsuitable for drinking. Only five cisterns (approximately one cistern to every 75 wells) was reported in the county, of which four were used for cooking and drinking, and all were in use for laundry purposes.

DRY HOLES

Fifteen dry holes were reported in Todd county at depths from 25 feet to 365 feet. The 365 foot hole was reported in T.38N., R.30W., and a 260 foot dry hole was reported in T.39N., R.25W. Most of the dry holes, however, were shallow, from 25 to 140 feet in depth.

TODD COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
35	25	12	32	180	73	-	8	1	-	-	12	-	2	-
35	26	12	24	160	82	1	6	3	-	-	12	-	6	1/2
35	27	12	30	168	84	-	9	3	1	1	10	2	3	1/8
35	28	11	24	175	80	-	4	7	1	-	11	-	3	8 1/2
35	29	8	80	175	144	-	2	3	-	-	8	-	5	1/2
35	30	8	40	190	89	2	4	1	-	-	8	-	2	1/2
35	31	2	34	55	44	-	-	2	-	-	2	-	1	1/8
35	32	2	60	60	60	-	1	1	-	-	2	-	-	-
36	25	18	64	182	93	-	1	13	7	-	18	-	4	2 1/2
36	26	9	30	120	65	-	3	4	-	-	9	-	2	1/8
36	27	14	60	160	103	-	6	6	1	1	14	-	7	1/2
36	28	17	20	145	85	1	7	8	-	-	17	-	2	1/4
36	29	19	40	186	99	2	7	9	-	1	19	-	7	1 3/4
36	30	14	60	190	104	-	3	7	-	-	13	1	5	1
36	31	2	180	190	185	-	2	-	-	-	2	-	1	-
36	33	1	69	69	69	-	-	1	-	-	1	-	-	-
37	25	9	14	133	61	-	3	6	-	-	9	-	1	1/4
37	26	5	55	125	93	-	-	4	-	-	5	-	2	1 1/8
37	27	6	50	140	87	-	5	-	-	-	6	-	-	-
37	28	27	25	150	98	-	6	21	-	-	27	-	7	1/8
37	29	18	25	200	121	1	7	9	1	-	17	1	3	2
37	30	3	120	172	140	-	-	3	-	-	3	-	-	-
37	31	1	150	150	150	-	-	-	-	-	1	-	-	-
37	33	5	64	186	111	-	1	4	-	-	5	-	2	-
38	25	2	31	55	43	-	2	-	-	-	2	-	1	-
38	26	8	14	80	39	-	2	6	-	-	8	-	3	-
38	27	24	15	120	70	-	4	20	1	2	23	1	15	3 1/4
38	28	16	14	180	70	-	9	6	-	-	16	-	2	-
38	29	6	52	140	90	-	3	3	1	-	6	-	2	1 1/8

(continued)

TODD COUNTY
Table 1.
DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
38	31	2	120	170	145	-	-	2	-	-	2	-	-	-
38	32	1	150	150	150	-	-	1	-	-	1	-	-	-
39	25	18	14	61	32	4	13	1	2	4	14	4	3	1 1/8
39	26	14	20	96	39	-	6	8	1	-	13	1	2	1/4
39	27	7	65	135	101	-	3	4	-	-	7	-	6	1 5/8
39	28	6	40	163	85	-	1	5	1	1	3	3	1	1
39	29	9	18	200	84	-	5	4	-	-	8	1	1	-
39	31	3	65	160	120	-	2	1	-	1	3	-	2	1
39	32	14	50	145	99	-	2	10	1	-	14	-	8	2 1/8
39	33	3	20	188	76	1	1	1	-	-	3	-	-	-
Total		368				12	138	188	18	11	354	14	111	31 3/8

NOTE: No wells reported for this group from the following townships and ranges: T.36N., R.32W.; T.37N., R.32W., T.38N., R.30W.

TODD COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
35	25	1	206	206	206	-	1	-	-	-	1	-	1	80
35	29	1	210	210	210	-	1	-	-	-	1	-	1	-
36	29	2	217	219	218	-	1	1	-	-	2	-	1	-
36	30	3	240	250	243	-	1	2	-	1	3	-	-	-
36	31	1	225	225	225	-	1	-	-	-	1	-	-	-
37	30	3	267	272	269	-	2	-	-	-	3	-	1	1/8
38	30	1	360	360	360	-	-	1	-	-	-	1	-	-
38	31	1	300	300	300	-	-	1	-	-	1	-	-	-
39	29	2	250	400	325	-	-	2	-	1	2	-	1	-
39	32	1	202	202	202	-	-	1	-	-	1	-	-	-
Total		16				-	7	8	-	2	15	1	5	80 1/8

NOTE: No other Wells over 200 feet in depth reported for Todd county

Table 3.

DATA ON FLOWING WELLS

35	35	1	80	80	80	-	1	-	-	-	1	-	-	-

NOTE: No other Flowing Wells reported for Todd county

Todd County Well Notes

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.35N., R.25W.
NE 1/4 Sec. not given.
75 feet:
"I have two 2 in. tubular wells 75 ft. deep - plenty soft water. One bored well 32 ft. deep plenty water (medium soft)."

T.35N., R.28W.
SE 1/4 Sec. 8
74 feet:
"This well is located on about the highest ground, in normal years the water is 6 to 8 ft. from surface."

T.36N., R.27W.
SE 1/4 Sec. 27
60 feet:
(red rock)

T.37N., R.28W.
SW 1/4 Sec. 19
49 feet:
"We get water anywhere we care to drill mostly tubular some cased 40 to 150 ft. I water in winter from 100 to 150 head of stock with one 3 in. well besides the house. I have never ran short of water here. I also have a supply tank."

T.37N., R.29W.
SW 1/4 Sec. 9
87 feet:
"An ideal location for a large well, this is a dry lake bed, no grass growing there and dry about 3 months of the year. In years of plenty moisture it held water the year around."

T.37N., R.30W.
SW 1/4 Sec. 24
129 feet:
"I have difficulty in finding a good sand for a well on farm which is 1 mi. south and east of well designated on map."

T.38N., R.26W.
NE 1/4 Sec. 30
30 feet:
"I have experienced no difficulty in getting post auger wells any place in this community. Having dug nine wells, except from 1 to 20 ft. of quicksand, I have got through it without much trouble."

T.38N., R.27W.
NE 1/4 Sec. 26
60 feet:
"We have rotten curbing in our well, it is impossible to use the water in the house because of the smell. We haul water for house use now. I need the well fixed soon."

T.38N., R.28W.
NW 1/4 Sec. 13
16 feet:
"Land mostly level and water reached 10 to 15 ft. good water west side running north about 20 rods wide in higher land."

T.38N., R.30W.
SW 1/4 Sec. 17
60 feet:
"The well was drilled in 1934 and ran a year. Sand and mud clogged the cylinder and caused the rods to back down twenty feet. The well was never repaired but if fixed I'm sure it would work O K (water good)."

T.39N., R.25W.
NW 1/4 Sec. 34
22 feet:
"I have made several wells where the water would be convenient at the barn or in the pasture but had to make a well away from the barn in order to have a suitable supply."

T.39N., R.26W.
NW 1/4 Sec. 27

96 feet:
"It is hard to strike water vein,bored three different places two had no water. These wells are about 2 or 3 hundred ft. from the well we got."

T.39N., R.26W.
SE 1/4 Sec. 33

30 feet:
"The well described was dug in gravel magnesia. There is no limit to the out put of water. Any where else we tried to dig we have found quicksand and to date no one has been able to curb it out or sink through it. We are located in a valley underlaid with water."

EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
of Agriculture and Mechanic Arts
Brookings, South Dakota

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